

2. A method according to claim 1, in which the writing light beam is [polarised] polarized in a direction substantially perpendicular to the axis of the section of the optical [fibre] fiber.
3. A method according to claim 1 [or claim 2], in which the writing light beam is an ultraviolet beam.
4. A method according to claim 3, in which the ultraviolet beam has a wavelength of about 244 [nanometres] nanometers.
5. A method according to [any one of claims 1 to 4] claim 1, in which the optical [fibre] fiber section is doped with at least one amplifying dopant.
6. A method according to claim 5, in which the optical [fibre] fiber section is doped with at least one rare earth element.
7. A method according to claim 6, in which the optical [fibre] fiber section is doped with erbium and ytterbium.
8. A method according to [any one of claims 1 to 7] claim 1, wherein the optical [fibre] fiber laser is stressed to provide substantially single [polarisation] polarization operation.
9. A method according to [any one of claims 1 to 7] claim 1, wherein the optical [fibre] fiber laser is stressed to provide dual [polarisation] polarization operation.

10. A method according to [any one of claims 1 to 8] claim 1, wherein the grating structure is written as a Moire phase shifted structure to provide lasing operation at two wavelengths having one [polarisation] polarization.

11. A method according to [any one of claims 1 to 8] claim 1, wherein the grating structure is written as first and second overlaying DFB grating structures to provide lasing operation at two wavelengths having one [polarisation] polarization.

12. An optical [fibre] fiber laser comprising an optical [fibre] fiber having a grating structure in a section of the optical [fibre] fiber, wherein the grating structure has a different grating strength for two orthogonal [polarisation] polarization modes of the optical [fibre] fiber, the grating structure comprising a discrete phase shift which is substantially identical for the two orthogonal [polarisation] polarization modes.

13. An optical [fibre] fiber laser according to claim 12, in which the optical [fibre] fiber section is doped with at least one amplifying dopant.

14. An optical [fibre] fiber laser according to claim 13, in which the optical [fibre] fiber section is doped with at least one rare earth element.

15. An optical [fibre] fiber laser according to claim 14, in which the optical [fibre] fiber section is doped with erbium and ytterbium.

16. An optical [fibre] fiber laser according to [any one of claims 12 to 15] claim 12, wherein the optical [fibre] fiber laser is configured to provide substantially single [polarisation] polarization operation.

17. An optical [fibre] fiber laser according to [any one of claims 12 to 15] claim 12, wherein the optical [fibre] fiber laser is configured to provide dual [polarisation] polarization operation.

18. An optical [fibre] fiber laser according to [any one of claims 12 to 15] claim 12, wherein the optical [fibre] fiber laser is configured to provide dual wavelength operation having one [polarisation] polarization.

19. An optical [fibre] fiber laser according to claim 18, wherein the grating structure is a Moire phase shifted structure having one [polarisation] polarization.

20. An optical [fibre] fiber laser according to claim 18, wherein the grating structure comprises first and second overlaying DFB grating structures.

21. An optical phase conjugator comprising:
one or more in-line optical [fibre] fiber lasers [according to any one of claims 12 to 20] for generating two substantially orthogonally [polarised] polarized pump light beams, each in-line optical fiber laser comprising an optical fiber having a grating structure in a section of the optical fiber, wherein the grating structure has a different grating strength for two orthogonal polarization modes of the optical fiber, the grating

structure comprising a discrete phase shift which is substantially identical for the two orthogonal polarization modes; and

a non-linear mixing waveguide for receiving and mixing the pump beams with an input signal beam.

22. A phase conjugator according to claim 21, in which the non-linear mixing waveguide is selected from the group consisting of: a dispersion-shifted optical [fibre] fiber; a chalcogenide optical [fibre] fiber; and a semiconductor optical amplifier.

23. A phase conjugator according to claim 21 [or claim 22], in which the two pump beams have wavelengths displaced to either side of the wavelength of the signal beam.

24. A phase conjugator according to [any one of claims 21 to 23] claim 21, in which the one or more in-line optical [fibre] fiber lasers comprise:

a first single [polarisation] polarization optical [fibre] fiber laser [according to claim 16];

a [polarisation] polarization controller for varying the [polarisation] polarization of a light beam generated by the first single [polarisation] polarization optical [fibre] fiber laser; and

a second single [polarisation] polarization optical [fibre] fiber laser [according to claim] connected in series with the first single [polarisation] polarization optical [fibre] fiber laser and the [polarisation] polarization controller,

wherein each of the first and second single polarization optical fiber lasers comprises an optical fiber having a grating structure in a section of the optical fiber.

wherein the grating structure has a different grating strength for two orthogonal polarization modes of the optical fiber, the grating structure comprising a discrete phase shift which is substantially identical for the two orthogonal polarization modes.

25. A phase conjugator according to [any one of claims 21 to 23] claim 21, in which the one or more in-line optical [fibre] fiber lasers comprise:

A1
cont.
a dual [polarisation] polarization optical [fibre] fiber laser [according to claim 17] comprising an optical fiber having a grating structure in a section of the optical fiber, wherein the grating structure has a different grating strength for two orthogonal polarization modes of the optical fiber, the grating structure comprising a discrete phase shift which is substantially identical for the two orthogonal polarization modes.

26. A laser source comprising:

a single [polarisation] polarization, dual wavelength laser [according to claim 18] having two output wavelengths and comprising an optical fiber having a grating structure in a section of the optical fiber, wherein the grating structure has a different grating strength for two orthogonal polarization modes of the optical fiber, the grating structure comprising a discrete phase shift which is substantially identical for the two orthogonal polarization modes;

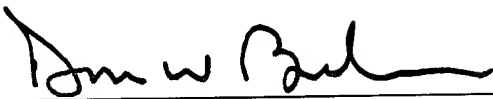
[means] a device for detecting and monitoring a beat frequency between the two output wavelengths of the laser; and

a feedback circuit operable to control the two output wavelengths of the laser to keep the detected beat frequency substantially constant.

Attorney Docket No. DYOUP0203US

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR

By 
Don W. Bulson
Registration No. 28,192

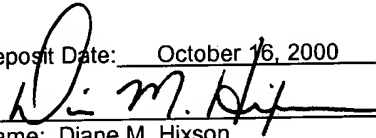
1621 Euclid Ave. - 19th Floor
Cleveland, Ohio 44116
(216) 621-1113

CERTIFICATION UNDER 37 CFR 1.10

I hereby certify that this Transmittal Letter and the papers indicated as being transmitted therewith are being deposited with the United States Postal Service on this date shown below in an envelope as "Express Mail Post Office to Addressee" under the below indicated Mailing Label Number, addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

Mailing Label No.: EK347082725US

Deposit Date: October 16, 2000


Name: Diane M. Hixson

C:\152\DWB\DYOU\IP0203\IP0203US.P02.wpd